Space Weather Forecast

Issued on Tuesday, 05 July 2022 at 13:05 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Increasing chance of radio blackouts from X-ray flares. Chance of Minor Geomagnetic Storms through midweek. Up to two Coronal Mass Ejections (CMEs) pending analysis.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the past 24 hours, however it showed a rising tendency. The most significant events were a trio of common-class flares: firstly, one from a now-faded sunspot in the northeast of the sun at 04/1333UTC. This produced a radio burst signature that is usually a sign of a CME having been produced. Secondly, the sun's northeastern horizon revealed a new sunspot that produced a further common class flare at 05/0347UTC; and thirdly a flare just shy of moderate class at 05/0407UTC from an innocuous-looking group in the southwest. This third flare also produced a radio burst, and had been visually fading in the period.

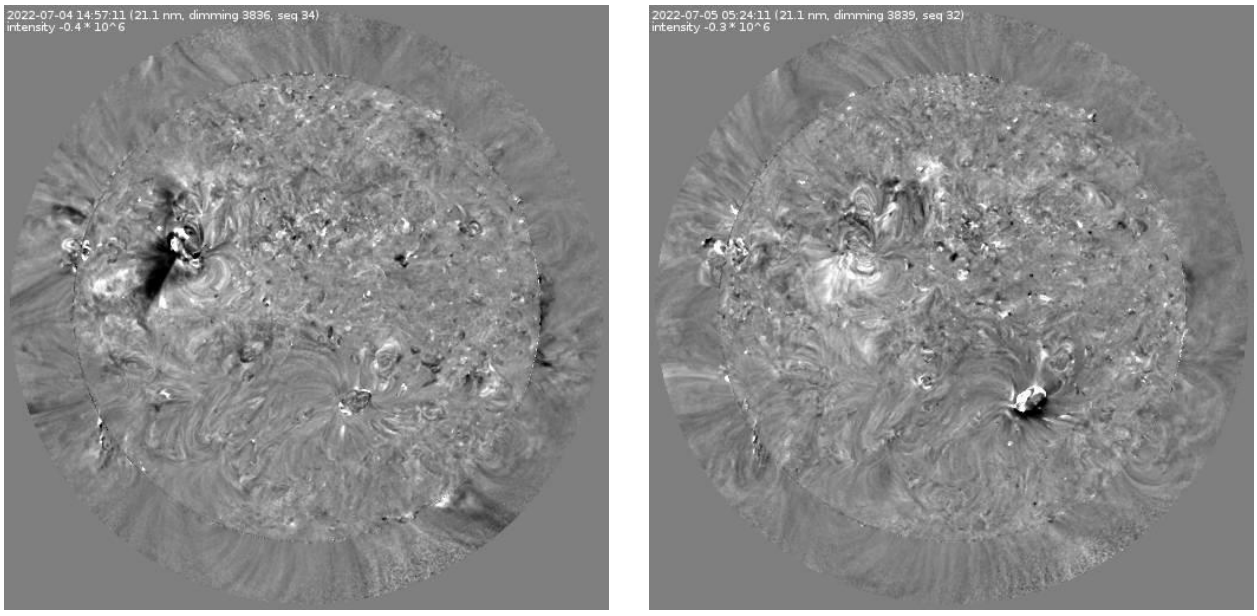

Figure 1: Time-integrated extreme UV imagery of the 04/1332UTC and 05/0407UTC flares. Those associated with possible CMEs show as darker patches on the above images Processing courtesy of SIDC ROB.

There were up to six sunspots on the Sun in total, with two fading away entirely only to be replaced by new arrivals.

The two radio burst signatures tied to the X-ray flares can be associated with CMEs. There is only very limited confirmatory imagery for both Coronal Mass Ejections (CMEs) at the time of

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writing, however the second of the two especially seems to have a possible Earth-bound component, and this is an active area of monitoring. Updates to the CME situation will follow.

Solar Wind / Geomagnetic Activity: The solar wind suggested CME effects segueing into a slow solar wind environment. The solar wind speed fell from slightly elevated to a more typical slow regime by the period's end. The number of particles in the wind also fell, as did their associated magnetic field.

The net effect of the above solar wind measures was a marked reduction in activity through the period, falling from just shy of Minor Storm G1 to end 04 July, to become quiet into 05 July.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be low, now with an increased daily slight chance of isolated moderate-class flares. A further increase is probable from the middle of the week as returning sunspot regions potentially cross onto the eastern solar horizon.

Solar Wind / Geomagnetic Activity: There is a possible slow CME from 29 June that may glance Earth on Day 1 (05 July), however no significant impacts are anticipated. There are then up to two unassessed CME candidates, with analysis pending imagery availability.

Otherwise, solar winds are anticipated to increase from normal background to elevated levels as a large coronal hole fast wind becomes geoeffective, perhaps most likely midweek. Late in the period solar winds should trend downwards again.

Energetic Particles / Solar Radiation: In the absence of any significant sunspot development, no solar radiation storms are expected, with only one sunspot in the western solar hemisphere at present.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	30	20	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	15	15	15	15
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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